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Driggers

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(54) **STACK ACCESSORY FOR PRINTER**

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(52) **U.S. Cl.** **347/104**; 400/162
(58) **Field of Search** 347/104; 271/131–134, 271/35, 23, 162–165, 119, 3.05, 3.06, 3.07; 400/624–629, 608.2, 605

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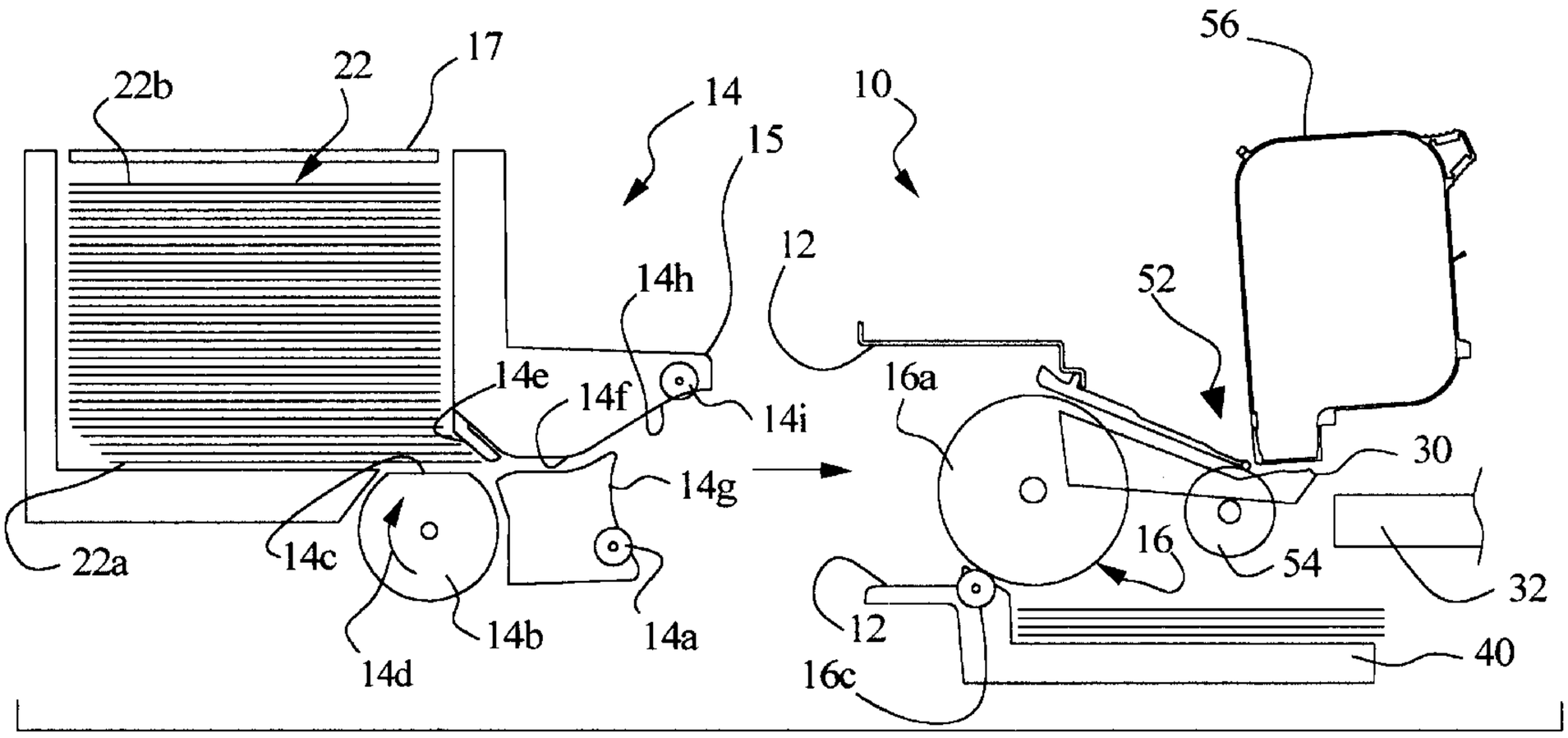
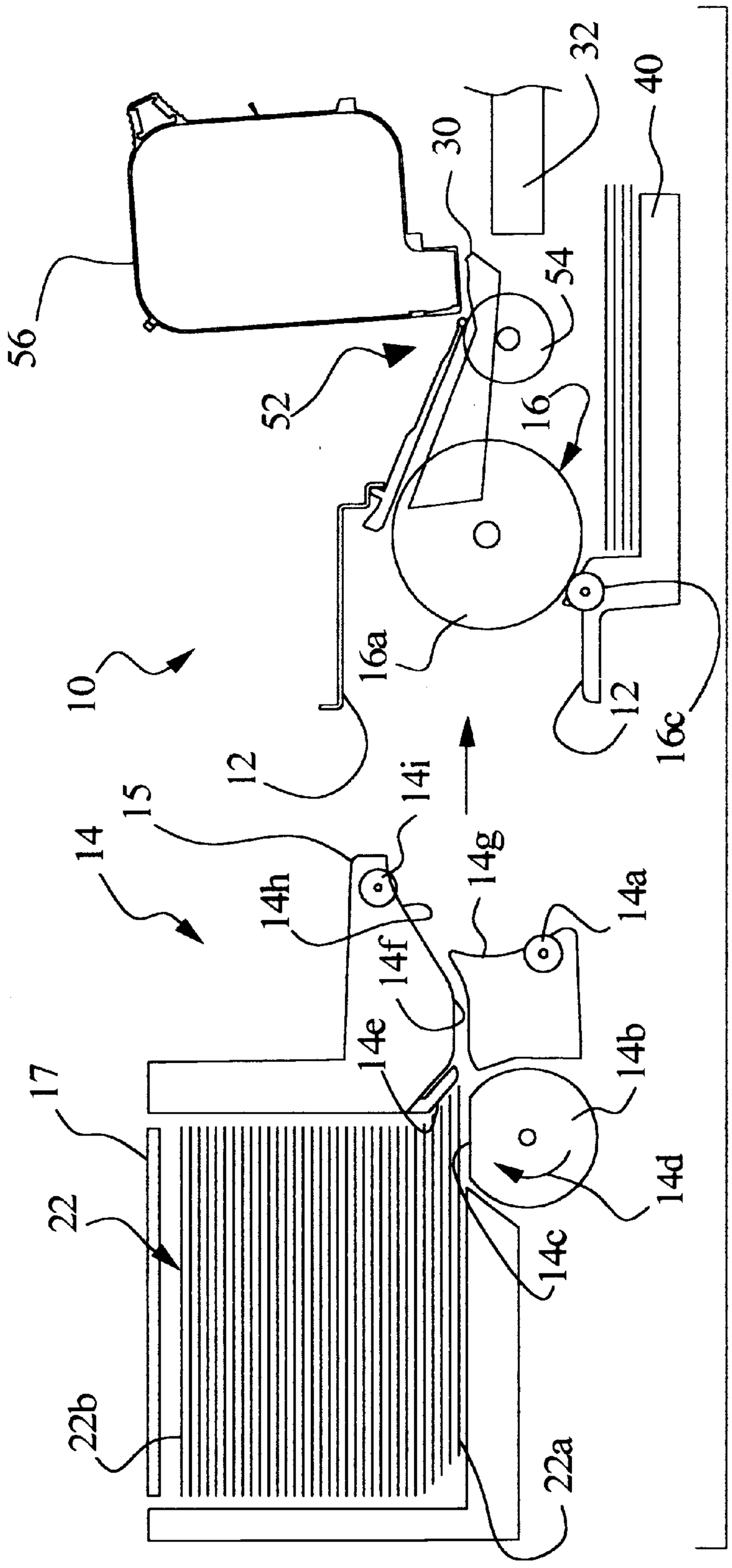
Assistant Examiner—Ly T Tran

(57) **ABSTRACT**

A stack accessory for a printer attaches as a module to a printer and provides a source of media. Media originates from a stack within the module passing media from the bottom of the stack to the printer. The top of the stack remains open to replenish the media stack without interrupting printing operations. The stack accessory serves particularly well as an envelope feed mechanism supporting a large inventory of envelopes therein. Large scale and continuous envelope printing operations result. Overall, a stack accessory under the present invention converts a generally conventional printer into a high-volume printing device enjoying uninterrupted printing operations associated with replenishing a supply of media fed therethrough.

2 Claims, 5 Drawing Sheets

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16c
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14e
14b
17
14d
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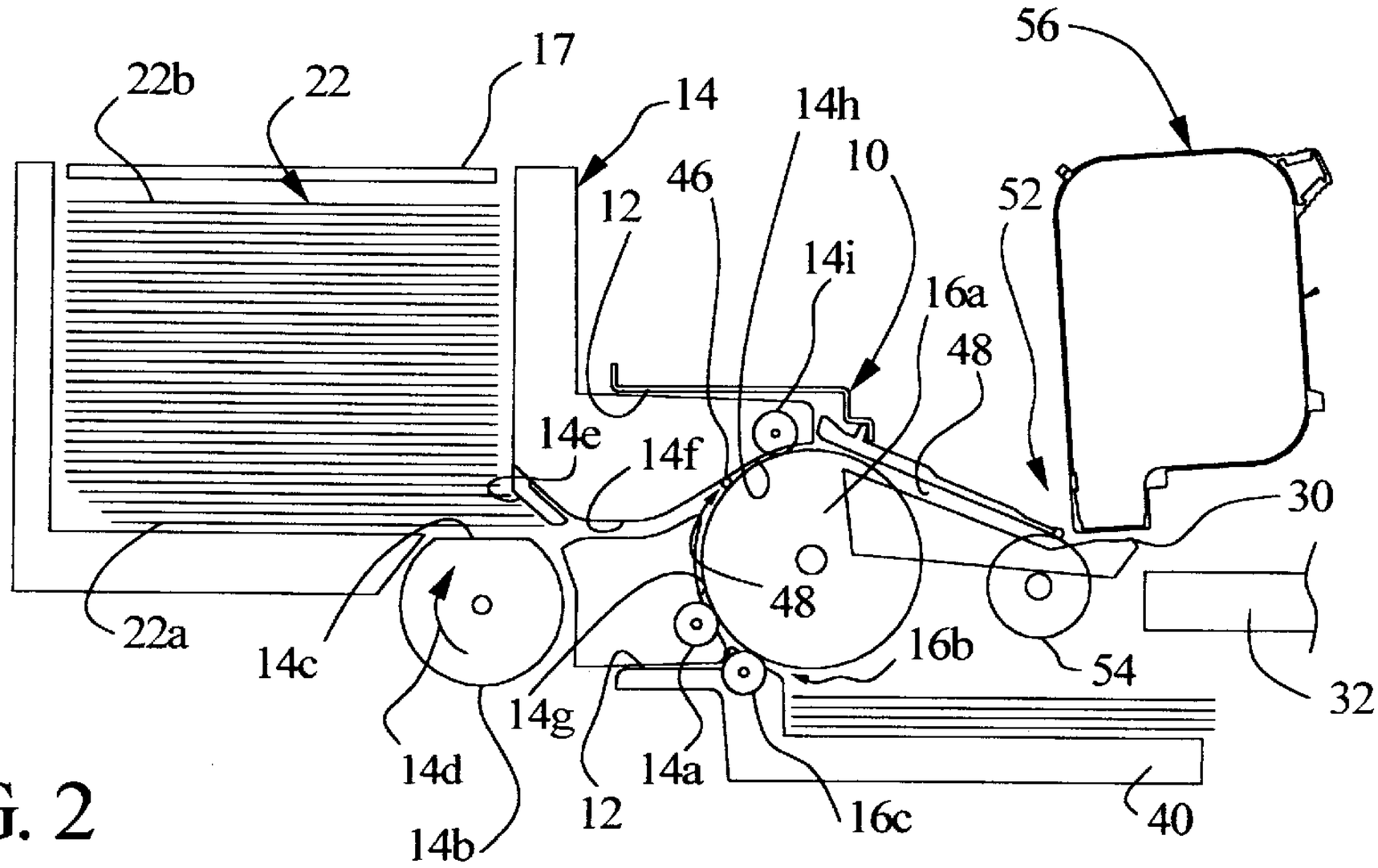
14c
22b
22a

FIG. 1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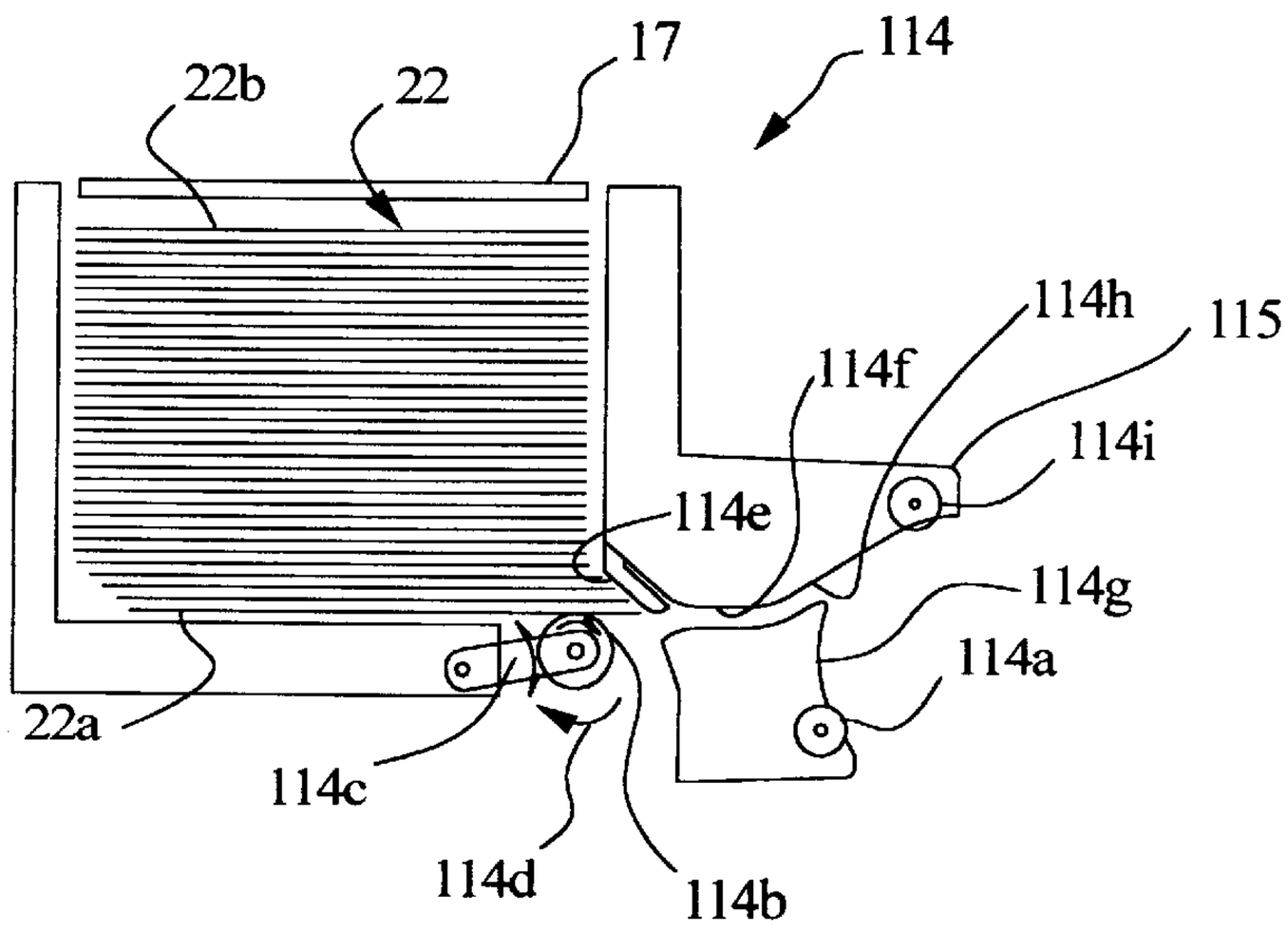
14b

FIG. 2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114d
114b

FIG. 3

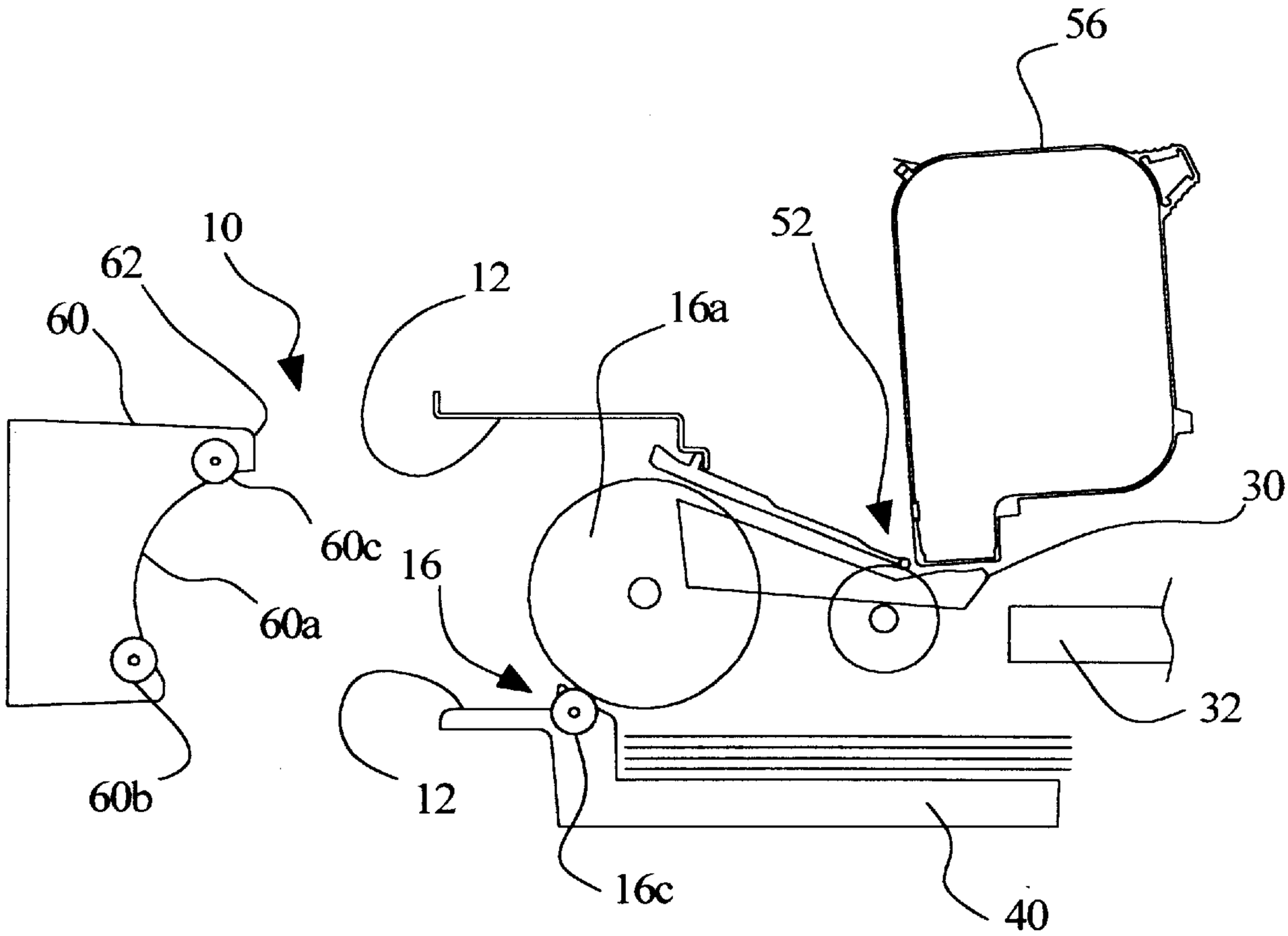

FIG. 4 (Prior Art)

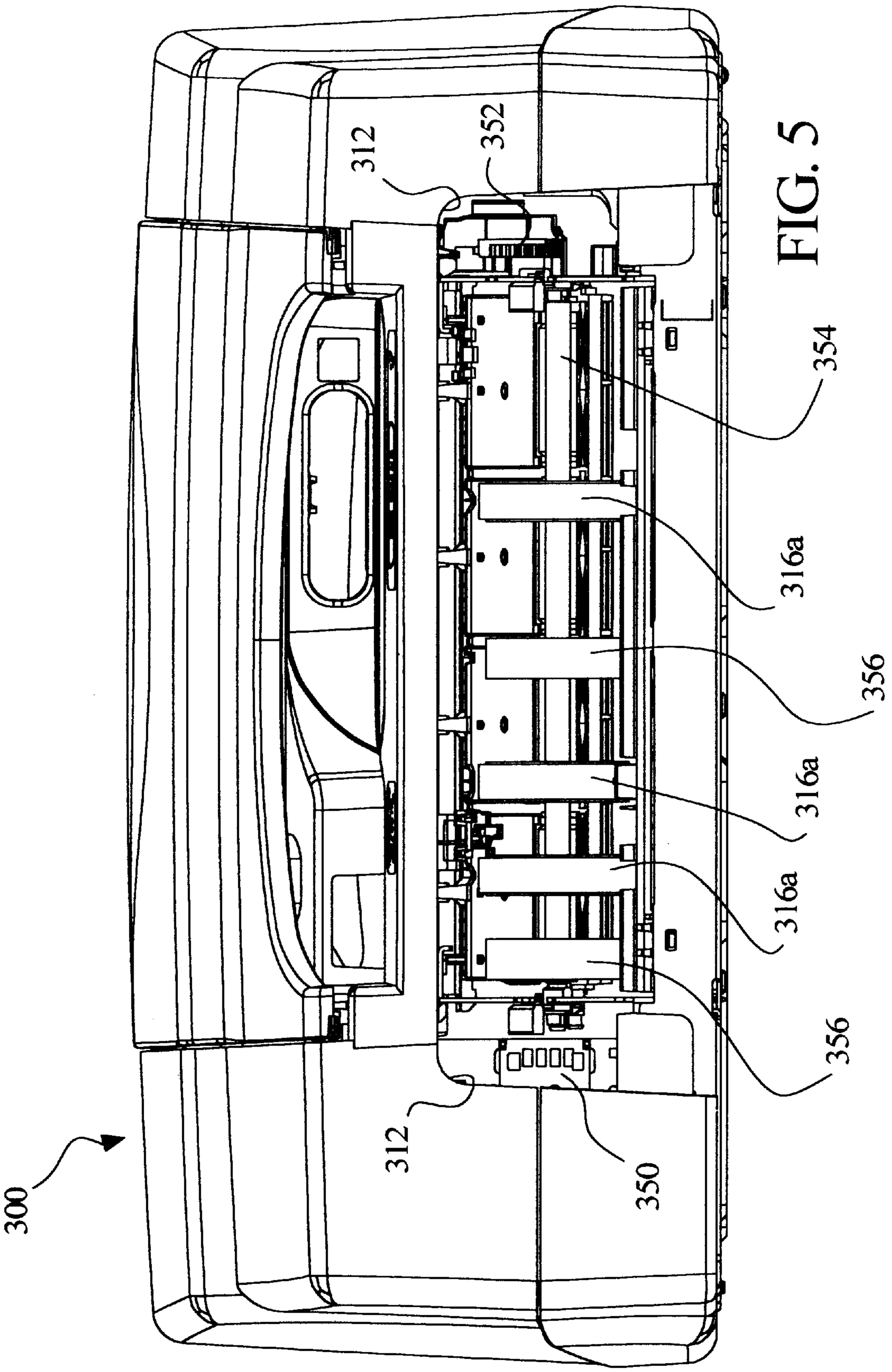

FIG. 5

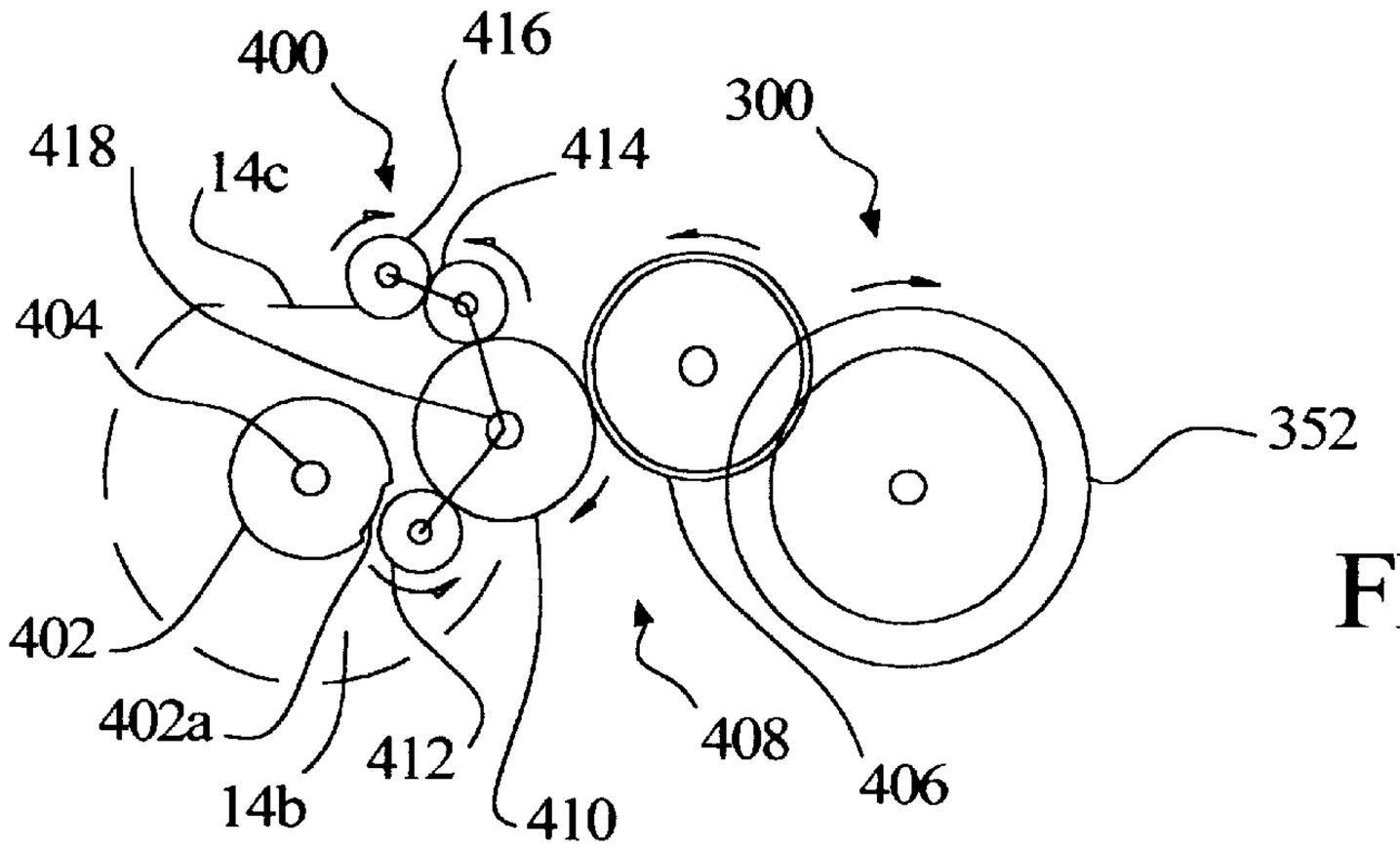

FIG. 6

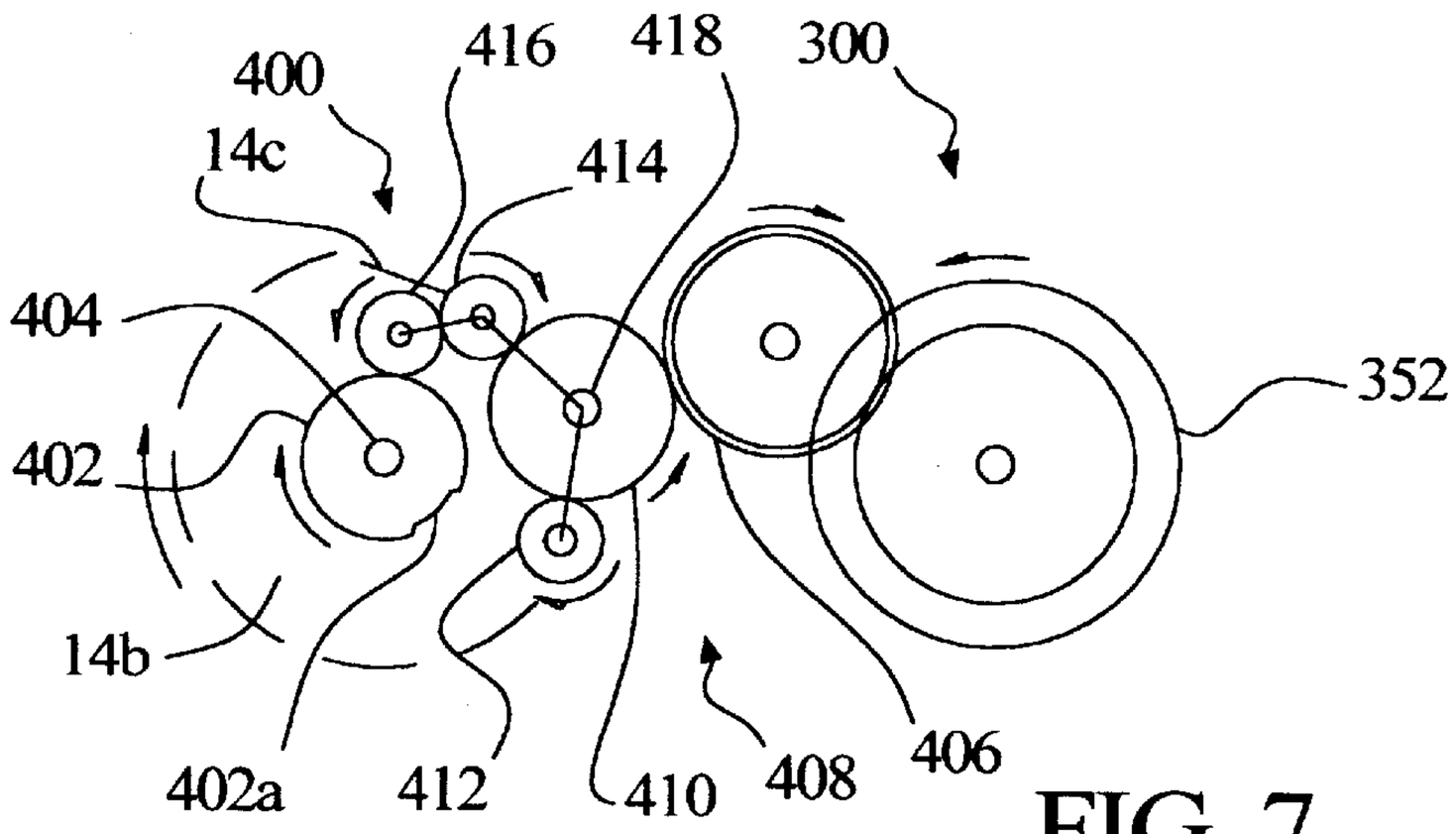

FIG. 7

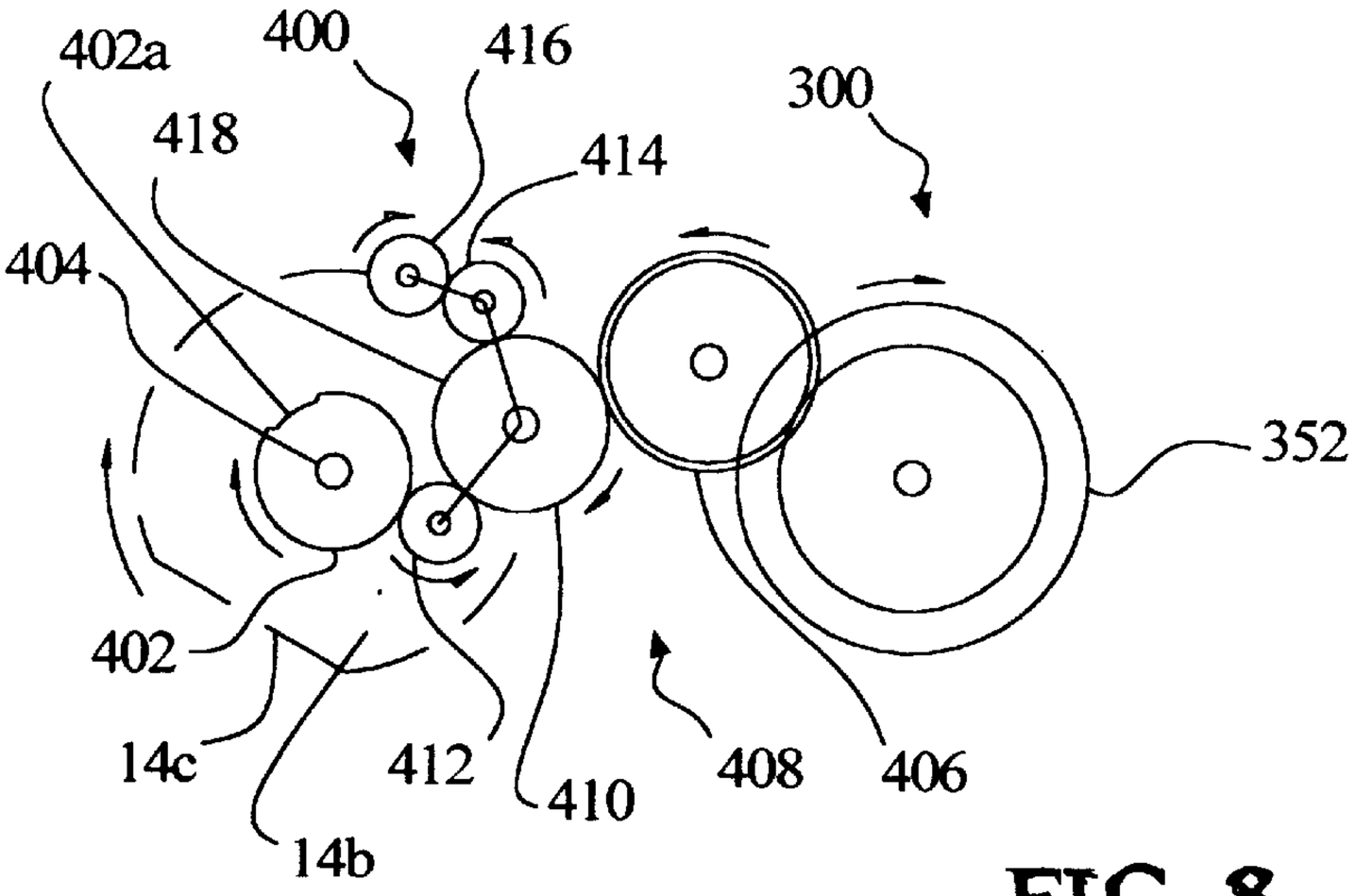

FIG 8

STACK ACCESSORY FOR PRINTER

BACKGROUND OF THE INVENTION

The present invention relates generally to printing devices, and particularly to infeed devices supplying media to a printer.

Most printing devices have various media source or infeed alternatives. For example, the most common primary media source for a printer is a media input tray holding sheet-form media. The tray, removable from the printer, holds a stack of media therein. Movable wall structures within configure the tray to hold, as an organized stack, media of selected size. A user loads or replenishes a supply of media by pulling the tray from the printer and dropping media from above onto a stack receptacle defined by the movable wall structures. When properly configured and located within the printer, the tray presents the top member of the stack of sheet-form media to a pick mechanism. In some printers, multiple such input trays positioned within the printer allow selection among different sheet-form media stacks. A pick mechanism collects from the media stack the top member and introduces it into the feed path of the printer. A media transport mechanism feeds media past a printing device applying print imaging and, eventually, through an output slot and onto an output tray of the printer. Thus, the user need not constantly feed individual sheet-form media into the printer.

Printers do not always apply print imaging to simple sheet-form media, e.g., single-panel ordinary paper stock. Printers frequently apply print imaging, e.g., addressing information, to envelopes. Envelopes come in a wide variety of sizes, including some recognized standard sizes. Envelopes have a more complex multi-panel structure as compared to simple sheet-form media. More particularly, envelopes serve as containers and have, typically, two planar sheet-form members comprising a front and back of the envelope as well as a flap structure selectively closing and opening in the envelope. Envelopes are thicker than ordinary sheet-form media. More complex envelope structures may contain two or more compartments, further adding to the overall thickness.

Fortunately, conventional media transport mechanisms in most printers handle the relatively more complex and thicker envelope structures. In other words, most printers typically have no significant problem feeding envelopes along a feed path and past a printing device. Thus, conventional media transport mechanisms are suitable for many envelope media.

Unfortunately, most printers do find challenge in collecting envelopes from a large stack of media. For example, most printers cannot handle very many envelopes stacked in a media input tray. As a result, printer users enjoy only limited benefit from automated media input sources such as a printer media input tray. Because such trays hold only a few envelopes, a user printing a significant number of envelopes must still handle many groups of such envelopes when replenishing the envelope supply in a conventional printer input tray. Furthermore, because media transport mechanisms collect the top member of a stack of media, printing operations must be interrupted to replenish from above a supply of media in a conventional printer input tray.

Many printers do include, however, an input slot receiving individual sheet-form media by manual placement therein. Input slots are commonly used for envelopes and special media, e.g., letterhead and special-form paper stock. Input slots support uninterrupted printing operations, i.e., a user

can feed a series of media through the printer without stopping printing operations. Unfortunately, to achieve such uninterrupted printing operations the user must handle each and every individual item fed into the printer. Accordingly, input slots do not support automated media input and provide little convenience when a large number of items are to be fed into the printer.

In many applications, however, a user wishes to print multiple envelopes without manipulating individual envelopes. In other words, users often wish to print a large number of envelopes and find inconvenient the need to feed individual envelopes through a printer input slot or constantly replenish a media input tray. In some cases users may even dedicate a given printer to envelope operation and, even though printing one or just several envelopes at a given time, find inconvenient the need to individually feed envelopes or frequently replenish a media input tray.

Thus, printer users have a variety of choices with respect to printing operations applying print imaging to, for example, envelopes. There is always the single-feed method, but this requires excess, i.e., individual, envelope manipulation. A limited number of envelopes can be stacked in some printer input trays, however, the number of envelopes which can be stacked, i.e., replenished, at one time is limited. Furthermore, a print operation making use of a stack of envelopes in an input tray must be interrupted whenever the user replenishes the limited supply of envelopes in a printer tray. Accordingly, the act of replenishing itself introduces inefficiency and inconvenience into an overall printing operation.

Printers dedicated in design and operation to the exclusive task of envelope processing could be fashioned to satisfy need for large volume envelope print imaging operations. Unfortunately, many people having occasional need for such printing operations have no access to such dedicated high-production level envelope processing and print imaging devices. Accordingly, it would be desirable to better facilitate, i.e., make more efficient and convenient, the application of print imaging to, for example, envelopes making use of printing apparatus of substantially conventional and widely available design.

It would be desirable, therefore, to provide a printer capable of taking as an input source a stack of media of significant number whereby a user can print consecutively from such input source a relatively large number of media at one time or may occasionally print one or several such media without manipulating individual media and without interrupting printing operations.

SUMMARY OF THE INVENTION

A stack accessory for a printer under the present invention serves as a module attachable to a conventional printer. The accessory includes a stack receptacle. The stack receptacle has a feed side and a replenish side. The receptacle being open at its replenish side. A stack outlet located adjacent the feed side of the receptacle collects from the stack media and feeds media into a printer attached thereto. As a result, a generally conventional printer may be converted into a high-volume printer enjoying uninterrupted printing operations because media may be replenished without stopping printing operations.

The subject matter of the present invention is particularly pointed out and distinctly claimed in the concluding portion of this specification. However, both the organization and method of operation of the invention, together with further advantages and objects thereof, may best be understood by

reference to the following description taken with the accompanying drawings wherein like reference characters refer to like elements.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings in which:

FIG. **1** illustrates schematically a printer and envelope stack accessory or media feed module according to a first embodiment of the present invention.

FIG. **2** illustrates the printer and the media feed module of FIG. **1** joined together during operation.

FIG. **3** illustrates schematically an alternative embodiment of a media feed module according to the present invention.

FIG. **4** (Prior Art) illustrates conventional use of a printer when not attached to the stack accessory of FIGS. **1–3**.

FIG. **5** illustrates in rear view a printer also capable of making use of a stack accessory according to the present invention.

FIGS. **6–8** illustrate a mechanical interface suitable for driving a stack accessory relative to the printer of FIG. **5**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention will be illustrated as a printer accessory attaching to a printer and providing as a media source a stack of envelopes. It will be understood, however, that a stack accessory according to the present invention may be employed to feed a variety of media types and media sizes including such media types and sizes as are typically fed through conventional or personal printing devices. The module is particularly useful, however, when used as a source of envelopes whereby the printer collects envelopes individually from the accessory, feeds individual envelopes through the printer, and delivers each envelope with print imaging thereon at the printer output. Because a relatively large number of envelopes may be stacked in the accessory, the user enjoys opportunity to print on a large number of envelopes without manipulating individual envelopes. Furthermore, and as described more fully hereafter, a printer accessory as provided under the present invention does not interrupt printer operation when a user replenishes a stack of media therein.

FIG. **1** illustrates schematically a printer **10** adapted for use in association with a stack accessory module **14** according to the present invention. In its basic design and operation, printer **10** is a substantially conventional printer. In other words, printer **10** includes a media transport path through a print zone and an output delivering media having print imaging applied thereto. In implementation of the present invention, however, printer **10** media feed mechanisms cooperate with structures of module **14** as shown herein. Printer **10** receives as an attachment the module **14** in implementation of the present invention, but as illustrated in FIG. **1**, envelope module **14** is detached from printer **10**. Printer **10** includes a rear opening **12** receiving a portion of module **14** therein for printing operations in accordance with the present invention. FIG. **2** illustrates module **14** as attached to printer **10** at rear opening **12** thereof.

Within printer **10**, and adjacent opening **12**, printer **10** includes a pick and feed mechanism **16**. Module **14** presents a stack **22** of, for example, envelopes to printer **10**. More particularly, module **14** presents to pick and feed mechanism **16** the bottom envelope **22***a* of stack **22**. When activated, i.e., with module **14** selected as a media input source, printer **10** collects the bottom envelope **22***a* from module **14** and, in cooperation with mechanism **16**, feeds bottom envelope **22***a* through printer **10** past a printing device **56**, e.g., inkjet print cartridge **56**, for application of print imaging thereon. Printer **10** then ejects envelope **22***a* at its output **30** onto an output tray **32**. Printer **10** then collects a next envelope **22***a,* i.e., the new bottom envelope **22***a,* from module **14** and executes the next print imaging operation.

Because module **14** presents the bottom envelope **22***a* to mechanism **16**, the top envelope **22***b* of stack **22** is the last envelope to be fed through printer **10**. In other words, module **14** defines a stack receptacle having at its lower end a media outlet and characterized as being open at its upper end. This leaves available the "open" top of stack **22** for replenishing media thereon from above at any time without interrupting activity at the receptacle outlet, i.e., without interrupting printing operations collecting media from module **14**. Accordingly, a user can at any time simply drop additional media onto stack **22** and thereby replenish module **14**.

Printer **10** includes a standard input tray **40**, e.g., a standard sheet-form media tray. With tray **40** selected as a media infeed device, module **14** contributes a portion of the feed mechanism in cooperation with pick and feed mechanism **16** of printer **10**. Thus, printer **10** collects media from tray **40** and prints in conventional fashion with module **14** attached thereto. Because envelopes of stack **22** are of significantly greater thickness than standard sheet-form media, only a few envelopes would fit as a stack within tray **40**. In accordance with the present invention, however, module **14** contains enough vertical space to hold a large number of envelopes in its stack **22**, and thereby relieves a user of need to frequently replenish a stock of envelopes as input media for printer **10**. Because a user can place media at the top of stack **22**, the user need not wait for a print job to complete or even interrupt a print job to replenish a supply of media in stack **22**.

In FIG. **2**, pick and feed mechanism **16** includes a pick wheel **16***a*. Wheel **16***a* is selectively driven into rotation by control programming and circuitry of printer **10**. Tray **40** includes conventional media support structures, i.e., a spring biased floor, to bring a stack of media in tray **40** into contact with pick wheel **16***a*. More particularly, the top member of a stack of media in tray **40** comes to bear against pick wheel **16***a*. Pick wheel **16***a,* upon rotation thereof, shears the top member of a stack of media in tray **40** and introduces it into a feed path **16***b*. Feed path **16***b* includes a rear-facing portion of the outer surface of pick wheel **16***a*. At the beginning of feed path **16***b,* a feed roller **16***c* urges media against wheel **16***a* and, therefore, into and along feed path **16***b*. In the particular embodiment illustrated herein, a second feed roller **14***a* lies along feed path **16***b,* the feed roller **14***a* also urges media against wheel **16***a* and, therefore, along path **16***b*. Roller **14***a,* however, is provided as a portion of module **14**, i.e., when placed within rear opening **12** of printer **10**. Module **14** also provides, with respect to feed path **16***b,* a guide surface **14***g*. Together, pick wheel **16***a,* roller **16***c,* roller **14***a,* and guide surface **14***g* establish a feed path and transport mechanism for media originating at input tray **40**. Feed path **16***b* terminates at a feed path junction **46**.

Media passes through junction **46** and enters feed path **48**. Feed path **48** also follows an outer surface of wheel **16***a*. Module **14** contributes to path **48** a guide surface **14***h* and a roller **14***i* pressing media against wheel **16***a*. Wheel **16***a* and

feed roller **14***i* cooperatively propel media onward along feed path **48** into a printing area **52** at the end of path **48**. Feed drive wheel **54** supports and propels media out of printer **10** at outlet **30** onto output tray **32**. As may be appreciated, printing area **52** may include a variety of devices, and in this particular embodiment, an inkjet print cartridge **56** projecting print imaging onto envelopes taken from stack **22**.

Module **14** includes an envelope pick wheel **14***b*. Envelope pick wheel **14***b* includes a flat **14***c*. The purpose of flat **14***c* is to accommodate media of various sizes. More particularly, pick wheel **14***b*, about its rounded exterior surface exclusive of flat **14***c*, engages and propels media out of module **14** and into printer **10**. As wheel **14***b* completes one rotation, flat **14***c* returns to its upward-facing position as illustrated in FIG. **1** and clears the path for, i.e., presents no resistance to, the trailing segment of media leaving module **14**. In this manner, media initially taken from stack **22** and driven into printer **10** encounters no further resistance from wheel **14***b* once feed mechanisms downstream take over media transport. As wheel **14***b* rotates as indicated at **14***d*, its rounded surface engages a downward-facing surface of bottom envelope **22***a* and propels envelope **22***a* forward into an envelope separator pad **14***e*. Both wheel **14***b* and pad **14***e* are high friction materials. Accordingly, engagement of envelope **22***a* by wheel **14***b* moves envelope **22***a* forward into feed path **14***f*. Wheel **14***b* rotates once to feed an envelope from stack **22** into printer **10**. Flat **14***c* insures that one and only one item of stack **22** enters feed path **14***f*. Envelope separator pad **14***e* engages other media in stack **22** above envelope **22***a* and blocks forward movement thereof into feed path **14***f*. Accordingly, as wheel **14***b* continues rotation, as indicated at reference numeral **14***d*, envelope **22***a* enters into and moves along feed path **14***f*. Eventually, envelope **22***a* reaches junction **46** and passes therethrough. Envelope **22***a* then moves into and along feed path **48** whereat feed wheel **14***i* engages envelope **22***a* and propels it further along feed path **48** for print imaging at printing area **52** and, eventually, exit at outlet **30**. Wheel **14***b* returns to its orientation as indicated in FIGS. **1** and **2** in preparation for collecting the next envelope **22***a* from the bottom of stack **22** within envelope module **14**.

Module **14** may be driven by gearing and transmission coupled to printer **10** or by an independent motor (not shown) provided in module **14** and operated in coordination with printer **10** operation.

FIG. **3** illustrates an alternative stack accessory module **114**. Module **114** is similar to module **14** in that it has structure accommodating entry into opening **12** of printer **10** and includes feed rollers **114***a* and **114***i* operating in conjunction with printer **10** to propel media through printer **10**. Module **114** differs, however, in its use of a high friction pick wheel **114***b* of significantly smaller diameter and having no flat portion. Instead, high friction pick wheel **114***b* rests at the distal end of a reciprocating arm **114***c*. Reciprocation of arm **114***c* into an upper position brings wheel **114***b* into contact with the lower-facing surface of envelope **22***a*. This propels envelope **22***a* forward, into and under envelope separator pad **114***e* as wheel **114***b* rotates in the direction **114***d*. As a result, wheel **114***b* propels envelope **22***a* into feed path **114***f*. Moving lever arm **114***c* downward disengages contact with stack **22** and holds off further feeding of a bottom envelope **22***a* into feed path **114***f*. Wheel **114***b* need only propel an envelope **22** far enough to reach feed wheel **114***i* whereat feed wheel **114***i* carries the envelope **22***a* forward through printer **10**. Thus, detecting an envelope **22***a* at wheel **114***i* provides a basis for moving, e.g., lowering, wheel **114***b* out of engagement with the stack **22**. In other words, wheel **114***b* is selectively moved into and out of contact with members of stack **22** to selectively advance just bottom envelope **22***a* through printer **10** in coordination with printing operations.

FIG. **4** (Prior Art) illustrates conventional use of printer **10** without module **14** installed, i.e., with a rear paper guide **60** installed. Rear paper guide **60** fits within opening **12** and provides a guide surface **60***a* and a pair of rollers, individually rollers **60***b* and **60***c*. With module **14** removed from printer **10**, guide surface **60***a* together with rollers **60***b* and **60***c* complement pick and feed mechanism **16** of printer **10**. Media taken from tray **40** moves between guide surface **60***a* and the rear-facing portion of pick wheel **16***a*. Media eventually passes along path **48** and past print area **52**. As may be appreciated, printer **10** in its configuration illustrated in FIG. **4** serves well as a conventional printer. In other words, the technology and structures employed in the configuration of printer **10** as illustrated in FIG. **4** may be taken as a conventional printer in terms of its complexity and cost of manufacture. Under the present invention, however, printer **10** as illustrated in FIG. **4** may be converted into its configuration as illustrated in FIG. **2**. In other words, rear paper guide **60** easily withdraws from printer **10** and module **14** easily fits in its place within opening **12**.

Conventional printer **10** is thereby enhanced by its ability to feed media without individual manipulation of large quantities of media as taken from stack **22**. Similar ease of conversion applies to module **114** as illustrated in FIG. **3**. Furthermore, printer **10** now enjoys uninterrupted printing operations, i.e., printing operations need not be suspended to replenish a supply of media in stack **22**.

While illustrated herein as holding envelopes, e.g., bottom envelope **22***a* and top envelope **22***b*, it will be understood that media stack **22** may include a variety of media types. In other words, modules **14** and **114** as described herein need not be limited in use to envelopes. Thus, in addition to managing a large supply of envelopes, a module **14** or **114** as described herein need not be limited to envelopes in its capacity as an automated infeed device. In this respect, modules **14** and **114** convert printer **10** into a higher volume printing device in that a constant supply of media may be applied to printer **10** without interruption associated with replenishing a media supply. In this regard, modules **14** and **114** may be configured to include movable wall structures as found in conventional infeed trays for the purpose of accommodating media of various custom or standard dimensions.

Modules **14** and **114** provide a further advantage in operation of printer **10** relative to other media feed arrangements. More particularly, media taken from stack **22** begins in a generally horizontal orientation and enjoys relatively less bending or buckling as compared to many paper feed mechanisms. Multi-panel media, e.g., envelopes, present a greater risk of buckling and potential media jam within a printer. As many printer users well understand, feeding envelopes through printers sometimes severely buckles envelopes, i.e., one panel of the envelope becomes severely crinkled. For example, consider printer **10** and its feed paths beginning at tray **40** and ending at printing area **52**. Each media taken from tray **40** moves through more than a 180-degree turn. A large diameter pick wheel **16***a* defining the overall feed path radius of curvature reduces degradation of media passing therealong. Modules **14** and **114**, however, present a relatively "flatter" overall feed path between modules **14** and **114** and printing area **52**. As a result, envelopes fed from modules **14** and **114** have less likelihood of degradation or jamming. In other words, as media taken

from stack **22** passes along feed path **14***f* it encounters a slight downward bend, but as it passes over the top of pick wheel **16***a* it encounters a slight opposite or upward bend. As a result, the two opposing feed path bends tend to rehabilitate media passing therethrough, i.e., cancel out buckling contributed by one another.

FIG. **5** illustrates in rear view a conventional printer **300** suitable for use in conjunction with the present invention. Printer **300** as illustrated in FIG. **5** is generally similar to a DeskJet **970***c* or a DeskJet **930***c* model inkjet printer, both manufactured by The Hewlett-Packard Company. Printer **300** is configured at its rear opening **312** to receive a duplex module (not shown), i.e., a module mounted at opening **312** to facilitate duplex printing. Duplex printing applies print imaging to both sides of media. Accordingly, the duplex module attached (not shown) at opening **312** re-circulates and flips media to present opposite sides to a print imaging device. Printer **300** and the duplex module (not shown) attachable thereto are more fully illustrated and described in U.S. Pat. No. 6,167,231 entitled Print Recording Apparatus Having Modular Autoduplex Mechanism and issued Dec. 26, 2000; and in U.S. Design Pat. No. 431,046 entitled Modular Duplexing Module For An Inkjet Printing Mechanism issued Sep. 19, 2000.

In the preferred form of the present invention, it is suggested that modules **14** and **114** connect by suitable gearing to printer **10** or printer **300** to operate feed mechanisms **14***b* and **114***b,* respectively. In other words, a mechanical coupling between the feed mechanisms of modules **14** and **114** driven by gearing of printers **10** and **300**. As may be appreciated, however, modules **14** and **114** may be provided with internal drive systems, i.e., electrical motors and associated gears coupled to devices **14***b* and **114***b*. As such, printers **10** and **300** would simply provide control signals to modules **14** and **114** in order to collect from modules **14** and **114** a sequence of media fed thereby.

With reference to FIG. **5**, rear opening **312** provides opportunity for access to an electrical interface **350** and a gear **352**. More particularly, opportunity for interfacing a module **14** or module **114** with printer **300** in implementation of the present invention, i.e., coordinated media feed and printing operations. Printer **300** includes a pick shaft **354**. Shaft **354** carries thereon a pair of wheels **356** for controlling envelope transport. Shaft **354** also carries three pick wheels **316***a*. As may be appreciated, gear **352** comprises a portion of gearing used to drive shaft **354**. Thus, control circuitry and programming of printer **300** selectively operate gear **352**. In the particular embodiment of the present invention illustrated in FIG. **5**, however, a module **14** couples to gear **352** to drive media feed mechanisms thereof as described more fully hereafter.

FIGS. **6–8** illustrate a drive system for media feeding in accordance with one aspect of the present invention. In FIGS. **6–8**, gear **352** of printer **300** is illustrated as coupled to a gear train **400** of a stack accessory, e.g., module **14** as described herein. In this particular example, gear train **400** drives pick wheel **14***b* of module **14**. FIG. **6** illustrates normal printing, i.e., when tray **40** is selected as a media input device. In this mode, forward rotation, clockwise in the view of FIGS. **6–8**, of gear **352** results in no rotation of wheel **14***b* and, therefore, no media taken from module **14**. More particularly, a drive gear **402** carried on wheel **14***b* drive shaft **404** includes a blank **402***a*. Blank **402***a* is a circumferential section of gear **402** having no teeth.

Gear train **400** includes a transfer gear **406** coupled to gear **352** of printer **300**. Transfer gear **406** drives a pivoting transmission **408**. Transmission **408** selectively drives gear **402** and, therefore, selectively drives wheel **14***b* of module **14**. Transmission **408** includes a primary gear **410** coupled to, i.e., driven by, transfer gear **406**. A set of drive gears mount in fixed relative orientation relative to gear **410**. More particularly, a drive gear **412** couples directly to gear **410**. Gear **414** couples directly to gear **410** and drives gear **416**. Transmission **408**, i.e., gears **410–416**, pivots or toggles about a pivot shaft **418**. With transmission **408** in a first position, i.e. as illustrated in FIG. **6**, drive gear **412** is positioned for engagement with drive gear **402**. In a second orientation, i.e., as illustrated in FIG. **7** and discussed more fully hereafter, transmission **408** positions drive gear **416** for engagement with drive gear **402**.

Thus, with transmission **408** positioned as illustrated in FIG. **6** drive gear **412** is positioned adjacent drive gear **402**. However, with blank **402***a* positioned adjacent gear **412** gear train **400** imparts no rotation to shaft **404** and, therefore, pick wheel **14***b* does not rotate during normal printing operations.

Normal printing operations include gear **352** rotating clockwise in the view of FIG. **6**. This drives transfer gear **406** into counterclockwise rotation and shifts transmission **408** into its orientation as illustrated in FIG. **6**. Thus, so long as gear **352** rotates clockwise, transmission **408** moves to its position as illustrated in FIG. **6** and, with blank **402***a* suitably positioned, imparts no rotation to wheel **14***b*.

FIG. **7** illustrates toggling of transmission **408** into its alternative position, i.e., an initial position rotating wheel **14***b* for feeding media from module **14**. Thus, with gear **352** rotating counterclockwise as viewed in FIG. **7**, gear **406** rotates clockwise and thereby pivots gear **410** counterclockwise. This causes gear **412** to move away from gear **402** and to bring gear **416** into engagement with gear **402**. As a result, gear **402** rotates shaft **404** and drives wheel **14***b* into clockwise rotation. This begins feeding of media from module **14**.

Counterclockwise rotation of gear **352** continues sufficiently to position blank **402***a* past its engagement point with gear **412**. At this point, gear **352** returns to clockwise rotation as illustrated in FIG. **8**. This clockwise rotation of gear **352** drives gear **406** into counterclockwise rotation and toggles transmission **408** placing gear **412** into engagement with gear **402**. Clockwise rotation of wheel **14***b* continues and, therefore, media continues to move under engagement with wheel **14***b* from module **14** into printer **300**. Clockwise rotation of gear **352** continues and media feeding continues until blank **402***a* of gear **402** reaches gear **412**. As may be appreciated, this both stops rotation of wheel **14***b* and repositions wheel **14***b* for a next media engagement, i.e., positions flat **14***c* in its upper position facing a downward-facing surface of bottom envelope **22***a*.

Thus, printer **300** control circuitry and programming may be adapted in its media feed procedures when module **14** is selected an input device. More particularly, to accomplish media feeding, printer **300** first reverses gear **352**, i.e., counterclockwise in the view of FIGS. **6–8**, and toggles transmission **408** to begin rotation of wheel **14***b*. Once sufficiently driven in counterclockwise direction, i.e., sufficient to move blank **402***a* out of its gear **412** engagement point, printer **300** reverses operation of gear **352**, i.e., drives it in a clockwise direction in the view of FIGS. **6–8**. This toggles transmission **408** into its alternative position, but continues moving wheel **14***b* in its media-feed rotational directional, i.e., clockwise in the view of FIGS. **6–7**. Overall, therefore, wheel **14***b* moves through one rotation beginning with flat **14***c* at its upper position and ending with flat **14***c* at its upper position.

Modules **14** and **114** can include an identification interface **15** and **115**, respectively. Similarly, paper guide **60** can include an identification interface **62** (FIG. **4**). A duplex module (not shown) can include a similar identification interface. An identification interface may be implemented according to a variety of methods, e.g., a particular surface contour or set of contact pins having particular resistance therebetween. Thus, a set of electrical pins suitably positioned on module **14** to contact electrical interface **350** of printer **300** allows electrical interface **350** to "read" or identify what module is attached to printer **300**. Generally an identification interface provides printers **10** and **300** with indication of the type of device presently attached to opening **12** or **312**, respectively. In other words, a module placed within openings **12** and **312** should identify to printers**10** and **300** its capabilities. In response, print operations making use of that module take into account its capabilities and particular requirements in order to, in the case of modules **14** and **114**, collect individual media from a media stack **22** held thereby.

As described herein, modules **14** and **114** may be replenished at any time by placing additional media within the stack receptacle defined thereby. So long as sufficient media rests within modules **14** and **114**, wheels **14***b* and **114***b*, respectively, carry sufficient pressure to develop sufficient friction to drive media out of modules **14** and **114**. When the supply of media is sufficiently low, however, insufficient weight of media may exist within modules **14** and **114** to develop enough friction to propel media therefrom. Accordingly, a weighted plate **17** may be placed upon the top member of stack **22** as illustrated FIGS. **1**, **2**, and **3**. The mass of plate **17** may vary according to particular applications. Plate **17** may not be necessary when constantly replenishing media within modules **14** and **114**, but may be employed where the potential for exhausting a supply of media within modules **14** and **114** exists.

Pick wheels **14***b* and **114***b* need be dimensioned and operated through sufficient rotation to propel a media sufficient distance for engagement by a next portion of the feed system. In other words, pick wheel **14***b* should be dimensioned such that a complete rotation thereof propels media sufficiently to engage roller wheel **14***i*. Thereafter, roller wheel **14***i* and feed wheel **16***a* further propel media along its feed path. Similar dimensioning and amount of rotation issues apply to module **114** to send for each activation of wheel **114***b* media from stack **22** sufficient distance to reach wheel **114***i* where after media is carried further without aid of wheel **114***b*. As noted above, wheel **114***b* should be withdrawn from its upper position once media reaches wheel **114***i*. This reduces drag on media when pulled forward by wheel **114***i*.

Thus, an improved infeed device for a printer has been shown in described. The infeed device of the present invention takes advantage in its distinction between a replenishing side of a media stack and a feed side of a media stack. In the particular embodiment illustrated herein, modules **14** and **114** collect media from a stack **22** at one side of the stack **22**, but permit replenishing of media at the other side of stack **22**. In other words, feeding occurs at the bottom of stack **22** and replenishing occurs at the top of stack **22**. As a result, and depending on the dimensions of a particular module **14** or **114**, a large number of media may be placed as a stack **22** therein. Users enjoy convenient and uninterrupted printing operations. Printing operations are convenient because a large number of media may be placed in a given stack **22**. Printing operations are uninterrupted because when a stack **22** needs to be replenished, it is replenished on an opposite side thereof relative to the feeding side of a stack **22**. Accordingly, printing operations need not be interrupted to replenish a media stack **22**.

Furthermore, an improved infeed system according to the present invention supports conversion of a conventional printer to a high-volume printer enjoying uninterrupted printing operations because media may be replenished without stopping printing operations. Thus, persons having possession of a conventional printer, e.g., printer **300**, can obtain at relatively little expense a stack accessory as provided under the present invention to convert the conventional printer into a more useful higher-volume printing device having large media capacity and ability to conduct continuous printing operations without interruption associated with replenishing media.

It will be appreciated that the present invention is not restricted to the particular embodiment that has been described and illustrated, and that variations may be made therein without departing from the scope of the invention as found in the appended claims and equivalents thereof.

What is claimed is:

1. An infeed module for a printer, said printer including a module mounting site, said infeed module comprising:

a mounting structure attachable at said mounting site of said printer;

a media stack receptacle, said stack receptacle having a feed side and a replenish side, said stack receptacle being open at said replenish side; and

a stack outlet adjacent said feed side of said stack receptacle, said stack outlet presenting media externally of said module, said stack outlet of said module including a high friction surface engaging through movement thereof media held in said stack receptacle, said movement of said high friction surface being driven mechanically by said printer, said module mounting site of said printer including in at least one of exposed or exposable first gear, said module including a complementary second gear positioned for engaging said first gear when said module is attached to said printer at said module mounting site.

2. A method of printer operation, said printer including a media transport mechanism, said method comprising the steps:

removing a first portion of said media transport mechanism;

inserting a stack accessory in place thereof, said stack accessory feeding media from a stack receptacle having a feed side and a replenish side, said stack receptacle being open at its replenish side and feeding media taken from said stack receptacle at its feed side, said stack accessory complementing a second portion of said media transport mechanism of said printer to selectively feed media from said stack accessory and through said printer, said method of printer operation coupling mechanically said stack accessory to said printer to drive operation of said stack accessory in propelling media therefrom.

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